

7.3 Solving Equations Using Quadratic Techniques

ex 1:

$$x^4 - 29x^2 + 100 = 0$$

U-subst.

$$\text{Let } u = x^2$$

$$u^2 - 29u + 100 = 0$$

$$(u-25)(u-4) = 0$$

$$u = 25 \quad u = 4$$

$$x^2 = 25 \quad x^2 = 4 \quad \{\pm 2, \pm 5\}$$

$$x = \pm 5 \quad x = \pm 2$$

ex 2:

$$x^3 + 216 = 0$$

Sum of Cubes

$$(x+6)(x^2 - 6x + 36) = 0$$

$$x = -6$$

$$\frac{6 \pm \sqrt{36 - 4(1)(36)}}{2}$$

$$\{-6, 3 \pm 3i\sqrt{3}\}$$

$$\frac{6 \pm \sqrt{108}}{2}$$

$$\frac{6 \pm 6i\sqrt{3}}{2}$$

ex 3:

$$x^{\frac{1}{2}} - x^{\frac{1}{4}} - 6 = 0$$

$$\text{Let } u = x^{\frac{1}{4}} \\ (x^{\frac{1}{4}})^2 = x^{\frac{1}{2}}$$

$$u^2 - u - 6 = 0$$

$$(u-3)(u+2) = 0$$

$$u = 3 \quad u = -2$$

$$(x^{\frac{1}{4}})^2 = 3 \quad x^{\frac{1}{4}} = -2$$

$$x = 81$$

$$\cancel{x = 16}$$

$$\{81\} \checkmark$$

ex 4:

$$x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 24 = 0$$

ex 5:

$$x^5 - 81x = 0$$

$$\{0, \pm 3i, \pm 3\}$$

$$x(x^4 - 81) = 0$$

$$x(x^2 + 9)(x^2 - 9) = 0$$

$$x = 0 \quad \sqrt{x^2 - 9} \quad x^2 = 9$$

$$x = \pm 3i \quad x = \pm 3$$

Another way to solve a radical equation

ex 6:

$$x + \sqrt{x} = 12$$

$$\text{Let } u = x^{1/2}$$

$$x + \sqrt{x} - 12 = 0$$

$$x + x^{1/2} - 12 = 0$$

1/2 HW
p 343
20, 23, 27, 29
grouping

$$20. t^5 - 256t = 0$$

$$23. x^3 + 729 = 0$$

$$27. y - 19\sqrt{y} = -60$$

$$29. s^3 + 4s^2 - s - 4 = 0$$